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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)
	10/534,368	OGURA ET AL.
	Examiner	Art Unit
	Robert T. Crow	1634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 30 August 2007.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1,4-13 and 17 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1, 4-13, and 17 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

FINAL ACTION

Status of the Claims

1. This action is in response to papers filed 30 August 2007 in which the specification and claims 1, 4-10, 12-13, and 17 were amended, claims 2-3 and 14-16 were canceled, and no new claims were added. All of the amendments have been thoroughly reviewed and entered.

The objections to the claims listed in the previous Office Action are withdrawn in view of the amendments.

The previous rejections under 35 U.S.C. 112, second paragraph, are withdrawn in view of the amendments. However, new rejections under 35 U.S.C. 112, second paragraph necessitated by the amendments are presented below.

The previous rejections under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) not reiterated below are withdrawn in view of the amendments. Applicant's arguments have been thoroughly reviewed and are addressed following the rejections necessitated by the amendments.

Claims 1, 4-13, and 17 are under prosecution.

Noncompliant Amendment

2. Applicant's amendments to the specification filed 30 August 2007 fail to comply with 37 CFR 1.121 for the following reason(s): the amendments to the paragraph at page 53, lines 5-18 found on page 7 of the amendments recites " 1.0.times.10.sup.-3" in line 4. However, the specification originally recited the number as "1.0×10^{-3}." Thus, text has been changed without being properly marked as changed.

3. It is emphasized that Applicant's response filed 30 November 2006 has been considered in the interest of customer service and compact prosecution. However, for the response to this Office Action to be complete, Applicant is <u>REQUIRED</u> to correct the errors listed above and file amendments that are compliant with 37 CFR 1.121. Failure to comply with this requirement will be considered **<u>nonresponsive</u>**.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 is indefinite in the recitation "[cm^{-3}]" in the last line of claim 6. The recited unit "[cm^{-3}]" is indefinite because the unit contains no amount related to electrical units; i.e., charges, number of electrons, coulombs, etc. Thus, in its current configuration, because the quantities that define the unit are unclear, the unit encompasses virtually any amount of charge density. It is suggested the claim be amended to clarify the exact units of charge density.

6. Applicant is advised to avoid the introduction of new matter in any amendments to the claim.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 1, 5-6 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollis et al (U.S. Patent No. 5,846,708, issued 8 December 1998) in view of America et al (U.S. Patent No. 6,300,160 B1, issued 9 October 2001).

Regarding claim 1, Hollis et al teach an optical DNA sensor. In a single exemplary embodiment, Hollis et al teach a device comprising a solid imaging device, in the form of an underlying CCD array having an array test sites formed thereon (Figure 15 and column 3, lines 50-55). Each test site of the array has DNA probes fixed (i.e., attached) thereon (column 4, lines 25-65). The probes at each test site are different (column 3, lines 1-8); thus, the sensor comprises a plurality of types of DNA probes each including a different nucleotide sequence. The CCD array comprises a plurality (i.e., at least 2, Figure 15) of photoelectric elements arranged on a substrate (Figure 15).

While Hollis et al teach a conductive layer in the form of gate electrodes 220 provided in the solid state imaging device (Figure 15) Hollis et al do not teach the gate electrodes are transparent. Thus, Hollis et al teach a base sensor that differs from the instantly claimed sensor because Hollis et al do not teach transparent gate electrodes.

However, America et al teach CCD-based electrodes within an image-sensing device (Abstract), wherein the electrodes are transparent ITO gate electrodes (column 4, lines 36-48), wherein the ITO gate electrodes have the added advantage of improved optical uniformity (column 2, lines 25-32). Thus, America et al teach the known technique of using transparent gate electrodes.

It is noted that the courts have held that "while features of an apparatus may be recited either structurally or functionally, claims directed to an apparatus must be distinguished from the prior art in terms of structure rather than function." *In re Schreiber*, 128 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997). In addition, "[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch &Lomb Inc.*, 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original). Therefore, the various <u>uses</u> recited in claim 1 (e.g., applying a voltage to attract a nucleotide

strand) fail to define additional structural elements to the device of claim 1. Because the prior art teaches the structural elements of claim 1, the claim is obvious over the prior art. See MPEP § 2114.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the sensor comprising a conductive layer in the form of a gate electrode layer as taught by Hollis et al with the transparent gate electrodes of America et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make the modification because said modification would have resulted in a sensor having the added advantage of electrodes with improved optical uniformity as explicitly taught by America et al (column 2, lines 25-32). In addition, it would have been obvious to the ordinary artisan that the known technique of using the transparent gate electrodes of America et al could have been applied to the sensor of Hollis et al with predictable results because the transparent gate electrodes of America et al predictably result in a CCD-based sensor.

Regarding claim 5, Hollis et al teach an optical DNA sensor. In a single exemplary embodiment, Hollis et al teach a device comprising a solid imaging device, in the form of an underlying CCD array having an array test sites formed thereon (Figure 15 and column 3, lines 50-55). Each test site of the array has DNA probes fixed (i.e., attached) thereon (column 4, lines 25-65). The probes at each test site are different (column 3, lines 1-8); thus, the sensor comprises a plurality of types of DNA probes each including a different nucleotide sequence The DNA probes are fixed on a layer of material (column 9, lines 15-32). The CCD array comprises a plurality (i.e., at least 2, Figure 15) of photoelectric elements arranged on a substrate (Figure 15).

It is noted that a reference may be relied upon for all that it would have reasonably suggested to one having ordinary skill the art, including nonpreferred embodiments. *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989). See also *Upsher-Smith Labs. v. Pamlab, LLC*, 412 F.3d 1319, 1323, 75 USPQ2d 1213, 1215 (Fed. Cir. 2005)(reference disclosing optional inclusion of a particular component teaches compositions that both do and do not contain that

component); Celeritas Technologies Ltd. v. Rockwell International Corp., 150 F.3d 1354, 1361, 47 USPQ2d 1516, 1522-23 (Fed. Cir. 1998) (The court held that the prior art anticipated the claims even though it taught away from the claimed invention. "The fact that a modem with a single carrier data signal is shown to be less than optimal does not vitiate the fact that it is disclosed."). Thus, the teaching of Hollis et al that the material to which the DNA probes are fixed may be light-transmissive (column 9, lines 15-32) encompasses the alternate embodiment wherein the material is not light-transmissive; i.e., absorbs exciting light. See MPEP § 2123 [R-5].

While Hollis et al teach a conductive layer in the form of gate electrodes 220 provided in the solid state imaging device (Figure 15) Hollis et al do not teach the gate electrodes are transparent. Thus, Hollis et al teach a base sensor that differs from the instantly claimed sensor because Hollis et al do not teach transparent gate electrodes.

However, America et al teach CCD-based electrodes within an image-sensing device (Abstract), wherein the electrodes are transparent ITO gate electrodes (column 4, lines 36-48), wherein the ITO gate electrodes have the added advantage of improved optical uniformity (column 2, lines 25-32). Thus, America et al teach the known technique of using transparent gate electrodes.

As noted above, apparatus claims cover what a device *is*, not what a device *does*. Therefore, the various uses recited in claim 5 (e.g., applying a voltage to attract a nucleotide strand) fail to define additional structural elements to the device of claim 5. Because the prior art teaches the structural elements of claim 5, the claim is obvious over the prior art.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the sensor comprising a conductive layer in the form of a gate electrode layer as taught by Hollis et al with the transparent gate electrodes of America et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make the modification because said modification would have resulted in a sensor having the added advantage of electrodes with improved optical uniformity as explicitly taught by America et al (column 2, lines 25-32).

In addition, it would have been obvious to the ordinary artisan that the known technique of using the transparent gate electrodes of America et al could have been applied to the sensor of Hollis et al with predictable results because the transparent gate electrodes of America et al predictably result in a CCD-based sensor.

Regarding claim 6, Hollis et al teach an optical DNA sensor. In a single exemplary embodiment, Hollis et al teach a device comprising a solid imaging device, in the form of an underlying CCD array having an array test sites formed thereon (Figure 15 and column 3, lines 50-55). Each test site of the array has DNA probes fixed (i.e., attached) thereon (column 4, lines 25-65). The probes at each test site are different (column 3, lines 1-8); thus, the sensor comprises a plurality of types of DNA probes each including a different nucleotide sequence The DNA probes are fixed on a layer of material (column 9, lines 15-32). The CCD array comprises a plurality (i.e., at least 2, Figure 15) of photoelectric elements arranged on a substrate (Figure 15).

While Hollis et al teach a conductive layer in the form of gate electrodes 220 provided in the solid state imaging device (Figure 15) Hollis et al do not teach the gate electrodes are transparent. Thus, Hollis et al teach a base sensor that differs from the instantly claimed sensor because Hollis et al do not teach transparent gate electrodes.

However, America et al teach CCD-based electrodes within an image-sensing device (Abstract), wherein the electrodes are transparent ITO gate electrodes (column 4, lines 36-48), wherein the ITO gate electrodes have the added advantage of improved optical uniformity (column 2, lines 25-32). Thus, America et al teach the known technique of using transparent gate electrodes.

As noted above, apparatus claims cover what a device *is*, not what a device *does*. Therefore, the various <u>uses</u> recited in claim 5 (e.g., applying a voltage to attract a nucleotide strand) fail to define additional structural elements to the device of claim 5. Because the prior art teaches the <u>structural</u> elements of claim 5, the claim is obvious over the prior art.

In addition, page 69 of the instant specification states that an ITO layer has a charge density that is 1.0×10^{20} cm^{-3} or less. Thus, the ITO gate electrodes of America et al have the charge density required by the instant claim, and the claim has been given the broadest reasonable interpretation consistent with the teachings of the specification regarding the required charge density (*In re Hyatt*, 211 F.3d1367, 1372, 54 USPQ2d 1664, 1667 (Fed. Cir. 2000) (see MPEP 2111 [R-1]).

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the sensor comprising a conductive layer in the form of a gate electrode layer as taught by Hollis et al with the transparent gate electrodes of America et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make the modification because said modification would have resulted in a sensor having the added advantage of electrodes with improved optical uniformity as explicitly taught by America et al (column 2, lines 25-32). In addition, it would have been obvious to the ordinary artisan that the known technique of using the transparent gate electrodes of America et al could have been applied to the sensor of Hollis et al with predictable results because the transparent gate electrodes of America et al predictably result in a CCD-based sensor.

Regarding claim 9, Hollis et al teach a DNA reading apparatus. In a single exemplary embodiment, Hollis et al teach a device comprising a solid imaging device, in the form of an underlying CCD array having an array test sites formed thereon (Figure 15 and column 3, lines 50-55). Each test site of the array has DNA probes fixed (i.e., attached) thereon (column 4, lines 25-65). The probes at each test site are different (column 3, lines 1-8); thus, the sensor comprises a plurality of types of DNA probes each including a different nucleotide sequence. The CCD array comprises a plurality (i.e., at least 2, Figure 15) of photoelectric elements arranged on a substrate (Figure 15). The apparatus of Hollis et al further comprises a driving unit for attaching the optical sensor detachably and for driving the solid imaging device; namely, the apparatus comprises transistors that reversibly disconnect (i.e., attach detachably) each site electrically, thereby driving the solid imaging device (column 20, lines 20-42).

While Hollis et al teach a conductive layer in the form of gate electrodes 220 provided in the solid state imaging device (Figure 15) Hollis et al do not teach the gate electrodes are transparent. Thus, Hollis et al teach a base sensor that differs from the instantly claimed sensor because Hollis et al do not teach transparent gate electrodes.

However, America et al teach CCD-based electrodes within an image-sensing device (Abstract), wherein the electrodes are transparent ITO gate electrodes (column 4, lines 36-48), wherein the ITO gate electrodes have the added advantage of improved optical uniformity (column 2, lines 25-32). Thus, America et al teach the known technique of using transparent gate electrodes.

As noted above, apparatus claims cover what a device *is*, not what a device *does*. Therefore, the various <u>uses</u> recited in claim 9 (e.g., applying a voltage to attract a nucleotide strand) fail to define additional structural elements to the device of claim 9. Because the prior art teaches the <u>structural</u> elements of claim 9, the claim is obvious over the prior art.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the sensor comprising a conductive layer in the form of a gate electrode layer as taught by Hollis et al with the transparent gate electrodes of America et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make the modification because said modification would have resulted in a sensor having the added advantage of electrodes with improved optical uniformity as explicitly taught by America et al (column 2, lines 25-32). In addition, it would have been obvious to the ordinary artisan that the known technique of using the transparent gate electrodes of America et al could have been applied to the sensor of Hollis et al with predictable results because the transparent gate electrodes of America et al predictably result in a CCD-based sensor.

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hollis et al (U.S. Patent No. 5,846,708, issued 8 December 1998) in view of America et al (U.S. Patent No. 6,300,160 B1, issued 9 October 2001) as applied to claim 1 above, and further in view of Iwasa (U.S. Patent No. 5,381,028, issued 10 January 1995).

Regarding claim 4, the sensor of claim 1 is discussed above in Section 9.

While Hollis et al further teach semiconductor layers (column 14, lines 40-50) and transistors integrated into the substrate (column 20, lines 20-35), neither Hollis et al nor America et al explicitly teach field effect transistor type photoelectric elements. Thus, Hollis et al in view of America et al teach a base sensor that differs from the instantly claimed sensor because neither Hollis et al nor America et al teach field effect transistor type photoelectric elements.

However, Iwasa teaches MOS field effect transistors having a semiconductor layer (Abstract), which have the added advantage of fewer defects and utility in the miniaturization of devices (column 1, line 65-column 2, line 3). Thus, Iwasa teaches the known technique of using MOS field effect transistors having a semiconductor layer.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the DNA sensor of Hollis et al in view of America et al with the field effect transistors of Iwasa with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a DNA sensor having the added advantage of fewer defects in a miniaturized device as explicitly taught by Iwasa (column 1, line 65-column 2, line 3). In addition, it would have been obvious to the ordinary artisan that the known technique of using the MOS field effect transistors having a semiconductor layer of Iwasa could have been applied to the sensor of Hollis et al in view of America et al with predictable results because the MOS field effect transistors having a semiconductor layer of Iwasa predictably result in transistors usable with gate electrodes.

11. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hollis et al (U.S. Patent No. 5,846,708, issued 8 December 1998) in view of America et al (U.S. Patent No. 6,300,160 B1, issued 9 October 2001) and in view of Bogart et al (U.S. Patent No. 5,468,606, issued 21 November 1995).

Regarding claim 7, Hollis et al teach an optical DNA sensor. In a single exemplary embodiment, Hollis et al teach a device comprising a solid imaging device, in the form of an underlying CCD array having an array test sites formed thereon (Figure 15 and column 3, lines 50-55). Each test site of the array has DNA probes fixed (i.e., attached) thereon (column 4, lines 25-65). The probes at each test site are different (column 3, lines 1-8); thus, the sensor comprises a plurality of types of DNA probes each including a different nucleotide sequence. The DNA probes are fixed on a dielectric multilayered film; namely, a dielectric layer of material followed by a layer of aluminum oxide are laminated on the substrate (column 9, lines 15-32), wherein aluminum oxide is also dielectric. The CCD array comprises a plurality (i.e., at least 2, Figure 15) of photoelectric elements arranged on a substrate (Figure 15). Hollis et al also teach optical detection of the phosphor ethidium bromide bound to DNA (column 9, lines 1-10).

While Hollis et al teach a conductive layer in the form of gate electrodes 220 provided in the solid state imaging device (Figure 15) Hollis et al do not teach the gate electrodes are transparent. Thus, Hollis et al teach a base sensor that differs from the instantly claimed sensor because Hollis et al do not teach transparent gate electrodes.

However, America et al teach CCD-based electrodes within an image-sensing device (Abstract), wherein the electrodes are transparent ITO gate electrodes (column 4, lines 36-48), wherein the ITO gate electrodes have the added advantage of improved optical uniformity (column 2, lines 25-32). Thus, America et al teach the known technique of using transparent gate electrodes.

As noted above, apparatus claims cover what a device *is*, not what a device *does*. Therefore, the various <u>uses</u> recited in claim 7 (e.g., applying a voltage to attract a nucleotide strand) fail to define additional structural elements to the device of claim 7. Because the prior art teaches the <u>structural</u> elements of claim 7, the claim is obvious over the prior art.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the sensor comprising a conductive layer in the form of a gate electrode layer as taught by Hollis et al with the transparent gate electrodes of America et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make the modification because said modification would have resulted in a sensor having the added advantage of electrodes with improved optical uniformity as explicitly taught by America et al (column 2, lines 25-32). In addition, it would have been obvious to the ordinary artisan that the known technique of using the transparent gate electrodes of America et al could have been applied to the sensor of Hollis et al with predictable results because the transparent gate electrodes of America et al predictably result in a CCD-based sensor.

While Hollis et al teach laminated dielectric layers (column 9, lines 15-32), neither Hollis et al nor America et al teach the layers of the films are one fourth of a wavelength of the light. Thus, Hollis et al in view of America et al teach a base sensor that differs from the instantly claimed sensor because neither Hollis et al nor America et al teach layers of films having one fourth of a wavelength of the light.

However, Bogart et al teach the formation of multi-layer stacks, wherein the thicknesses are one quarter wavelength of the light, which has added advantage of allowing attenuation of the wavelength of a specific detection color (column 19, lines 20-30 and column 21, lines 1-5). Thus, Bogart et al teach the known technique of using layers of films having one fourth of a wavelength of the light.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the multilayered DNA sensor of Hollis et al in view of America et al with the layers of quarter wavelength thicknesses as taught by Bogart et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a DNA sensor having the added advantage of allowing attenuation of the specific wavelength of the detection color as explicitly taught by Bogart et al (column 19, lines 20-30 and column 21, lines 1-5). In addition, it would have been obvious to

the ordinary artisan that the known technique of using the quarter wavelength films of Bogart et al could have been applied to the sensor of Hollis et al in view of America et al with predictable results because the quarter wavelength films of Bogart et al predictably result in a device usable for multicolor detection of analytes.

12. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hollis et al (U.S. Patent No. 5,846,708, issued 8 December 1998) in view of Hawkins et al (U.S. Patent No. 4,746,622, issued 24 May 1988) in view of Bogart et al (U.S. Patent No. 5,468,606, issued 21 November 1995).

Regarding claim 8, Hollis et al teach an optical DNA sensor. In a single exemplary embodiment, Hollis et al teach a solid imaging device in the form of a CCD array, which comprises a plurality of photoelectric elements arranged apart from each other (i.e., Figure 15). The elements are on substrate that is transparent (column 10, lines 5-6), and has a bottom gate electrode having a shading property; namely, gate electrodes of tungsten (column 9, lines 15-65), which has a shading property because it is not entirely transparent. Each test site of the array has DNA probes fixed (i.e., attached) thereon (column 4, lines 25-65). The probes at each test site are different (column 3, lines 1-8); thus, the sensor comprises a plurality of types of DNA probes each including a different nucleotide sequence. The DNA probes are fixed on a dielectric multilayered film; namely, a first layer of material and an upper protective layer of silicon nitride are on the substrate, wherein the silicon nitride is transparent and has the probes thereon (column 9, lines 15-32).

Hollis do not teach the CCD wherein the first layer of material is a light sensitive semiconductor layer or a CCD having a top gate electrode. Thus, Hollis et al teach a base sensor that differs from the instantly claimed sensor because Hollis et al do not teach the first layer is a light sensitive semiconductor layer or a CCD having a top gate electrode.

However, Hawkins et al teach a CCD having a light sensitive semiconductor layer; namely, a layer of amorphous silicon (column 14, lines 15-31). The CCD of Hawkins et al also has two sets of gate

electrodes, wherein the second set of gate electrodes is on the top of the CCD and is made of polycrystalline silicon (column 10, lines 48-62), which is transparent, and thus light-transmissive. The CCD thus has lower gate electrodes 705a, a barrier layer 731 of polycrystalline silicon (Figure 27, column 12, lie 60-column 13, line 17, and column 14, lines 15-32). Hawkins et al also teach the CCD configuration has the added advantage of simpler manufacturing techniques and materials (column 7, lines 25-40). Thus, Hawkins et al teach a light sensitive semiconductor layer in a CCD having top and bottom gate electrodes.

It would therefore have been obvious to a person or ordinary skill in the art at the time the claimed invention was made to have modified the sensor comprising a CCD array of Hollis et al with the CCD array having a light sensitive semiconductor layer and a top gate electrode as taught by Hawkins et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a DNA sensor having the added advantage of having a solid state imaging device that is manufactured by using simple techniques and materials as explicitly taught by Hawkins et al (column 7, lines 25-40). In addition, it would have been obvious to the ordinary artisan that the known technique of using the CCD layers and multiple gate electrodes of Hawkins et al could have been applied to the sensor of Hollis et al with predictable results because the CCD layers and multiple gate electrodes of Hawkins et al predictably result in viable CCD devices.

While Hollis et al teach laminated multiple layers (column 9, lines 15-32), neither Hollis et al nor Hawkins et al teach one of the layers is a transparent conductive layer. Thus, Hollis et al in view of Hawkins et al teach a base sensor that differs from the instantly claimed sensor because neither Hollis et al nor Hawkins et al teach one of the layers is a transparent conductive layer.

However, Bogart et al teach the formation of multi-layer stacks, wherein one of the layers is a conducting transparent metal oxide layer (column 5, lines 5-25). The multilayer stack of Bogart et al has the added advantage of allowing attenuation of the wavelength of a specific detection color (column 19,

lines 20-30 and column 21, lines 1-5). Thus, Bogart et al teach the known technique of using multi-layer stacks, wherein one of the layers is conducting and transparent.

As noted above, apparatus claims cover what a device *is*, not what a device *does*. Therefore, the various uses recited in claim 8 (e.g., applying a voltage to attract a nucleotide strand) fail to define additional structural elements to the device of claim 8. Because the prior art teaches the structural elements of claim 8, the claim is obvious over the prior art.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the multilayered DNA sensor of Hollis et al in view of Hawkins et al with the multiple layers Bogart et al with a reasonable expectation of success. The modification would result in a multiple-layered stack having a transparent conductive layer between the DNA probes and the plurality of photoelectric elements. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a DNA sensor having the added advantage of allowing attenuation of the specific wavelength of the detection color as explicitly taught by Bogart et al (column 19, lines 20-30 and column 21, lines 1-5). In addition, it would have been obvious to the ordinary artisan that the known technique of using the multiple-layered stack having a transparent conductive layer of Bogart et al could have been applied to the sensor of Hollis et al in view of Hawkins et al with predictable results because the multiple-layered stack having a transparent conductive layer of Bogart et al predictably results in a device usable for multicolor detection of analytes.

13. Claim 10-13 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hollis et al (U.S. Patent No. 5,846,708, issued 8 December 1998) in view of Hawkins et al (U.S. Patent No. 4,746,622, issued 24 May 1988) in view of Bogart et al (U.S. Patent No. 5,468,606, issued 21 November 1995) in view of McGall et al (U.S. Patent No. 5,843,655, issued 1 December 1998).

Regarding claims 10-11, Hollis et al teach a DNA reading apparatus. In a single exemplary embodiment, Hollis et al teach an optical DNA sensor comprising a solid imaging device in the form of a

CCD array, which comprises a plurality of photoelectric elements arranged apart from each other (i.e., Figure 15). The elements are on substrate that is transparent (column 10, lines 5-6), and has a bottom gate electrode having a shading property; namely, gate electrodes of tungsten (column 9, lines 15-65), which has a shading property because it is not entirely transparent. Each test site of the array has DNA probes fixed (i.e., attached) thereon (column 4, lines 25-65). The probes at each test site are different (column 3, lines 1-8); thus, the sensor comprises a plurality of types of DNA probes each including a different nucleotide sequence. The DNA probes are fixed on a dielectric multilayered film; namely, a first layer of material and an upper protective layer of silicon nitride are on the substrate, wherein the silicon nitride is transparent and has the probes thereon (column 9, lines 15-32).

Hollis do not teach the CCD wherein the first layer of material is a light sensitive semiconductor layer or a CCD having a top gate electrode. Thus, Hollis et al teach a base sensor that differs from the instantly claimed sensor because Hollis et al do not teach the first layer is a light sensitive semiconductor layer or a CCD having a top gate electrode.

However, Hawkins et al teach a CCD having a light sensitive semiconductor layer; namely, a barrier layer of amorphous silicon (column 14, lines 15-31). The CCD of Hawkins et al also has two sets of gate electrodes, wherein the second set of gate electrodes is on the top of the CCD and is made of polycrystalline silicon (column 10, lines 48-62), which is transparent, and thus light-transmissive. The CCD thus has lower gate electrodes 705a, a barrier layer 731 of polycrystalline silicon (Figure 27, column 12, lie 60-column 13, line 17, and column 14, lines 15-32). Hawkins et al also teach the CCD configuration has the added advantage of simpler manufacturing techniques and materials (column 7, lines 25-40). Thus, Hawkins et al teach a light sensitive semiconductor layer in a CCD having top and bottom gate electrodes.

It would therefore have been obvious to a person or ordinary skill in the art at the time the claimed invention was made to have modified the sensor comprising a CCD array of Hollis et al with the CCD array having a light sensitive semiconductor layer and a top gate electrode as taught by Hawkins et

al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a DNA sensor having the added advantage of having a solid state imaging device that is manufactured by using simple techniques and materials as explicitly taught by Hawkins et al (column 7, lines 25-40). In addition, it would have been obvious to the ordinary artisan that the known technique of using the CCD layers and multiple gate electrodes of Hawkins et al could have been applied to the sensor of Hollis et al with predictable results because the CCD layers and multiple gate electrodes of Hawkins et al predictably result in viable CCD devices.

While Hollis et al teach laminated multiple layers (column 9, lines 15-32), neither Hollis et al nor Hawkins et al teach one of the layers is a transparent conductive layer. Thus, Hollis et al in view of Hawkins et al teach a base sensor that differs from the instantly claimed sensor because neither Hollis et al nor Hawkins et al teach one of the layers is a transparent conductive layer.

However, Bogart et al teach the formation of multi-layer stacks, wherein one of the layers is a conducting transparent metal oxide layer (column 5, lines 5-25). The multilayer stack of Bogart et al has the added advantage of allowing attenuation of the wavelength of a specific detection color (column 19, lines 20-30 and column 21, lines 1-5). Thus, Bogart et al teach the known technique of using multi-layer stacks, wherein one of the layers is conducting and transparent.

As noted above, apparatus claims cover what a device *is*, not what a device *does*. Therefore, the various <u>uses</u> recited in claim 10 (e.g., applying a voltage to attract a nucleotide strand) fail to define additional structural elements to the device of claim 10. Because the prior art teaches the <u>structural</u> elements of claim 10, the claim is obvious over the prior art.

It would therefore have been obvious to a person of ordinary skill in the art at the time the claimed invention was made to have modified the multilayered DNA sensor of Hollis et al in view of Hawkins et al with the multiple layers Bogart et al with a reasonable expectation of success. The modification would result in a multiple-layered stack having a transparent conductive layer between the

DNA probes and the plurality of photoelectric elements. The ordinary artisan would have been motivated to make such a modification because said modification would have resulted in a DNA sensor having the added advantage of allowing attenuation of the specific wavelength of the detection color as explicitly taught by Bogart et al (column 19, lines 20-30 and column 21, lines 1-5). In addition, it would have been obvious to the ordinary artisan that the known technique of using the multiple-layered stack having a transparent conductive layer of Bogart et al could have been applied to the sensor of Hollis et al in view of Hawkins et al with predictable results because the multiple-layered stack having a transparent conductive layer of Bogart et al predictably results in a device usable for multicolor detection of analytes.

Hollis et al further teach the sensor is part of a DNA reading apparatus; namely, the solid imaging device is irradiated by a light source (column 8, line 57-column 9, line 15). However, neither Hollis et al, Hawkins et al, nor Bogart teach a specific light irradiation member (i.e., claim 10) disposed below the sensor (i.e., claim 11). Thus, Hollis et al teach a base sensor that differs from the instantly claimed sensor because neither Hollis et al, Hawkins et al, nor Bogart et al teach a specific light irradiation member disposed below the sensor.

However, McGall et al teach a DNA reading apparatus comprising an array of DNA probes in the form of oligonucleotides (Figure 12) further comprising a solid state detector in the form of a CCD built into a wafer of the oligonucleotide array (column 12, lines 25-45). The apparatus further comprises an excitation source, which is a light irradiation member, disposed below the sensor (i.e., claim 11). McGall teach the apparatus having this arrangement of parts has the added advantage of allowing two-dimensional imaging of the DNA sensor (i.e., oligonucleotide array; column 12, lines 1-10). Thus, McGall et al teach the known technique of having a specific light irradiation member disposed below the sensor.

It would therefore have been obvious to a person or ordinary skill in the art at the time the claimed invention was made to have modified the apparatus of Hollis et al in view of Hawkins et al in view of Bogart et al with the light irradiation member underneath the sensor as taught by McGall et al with a reasonable expectation of success. The ordinary artisan would have been motivated to make such

a modification because said modification would have resulted in a DNA sensor having the added advantage of allowing two-dimensional imaging of the DNA sensor taught by McGall et al (column 12, lines 1-10). In addition, it would have been obvious to the ordinary artisan that the known technique of using the specific light irradiation member disposed below the sensor of McGall et al could have been applied to the sensor of Hollis et al in view of Hawkins et al in view of Bogart et al with predictable results because the specific light irradiation member disposed below the sensor of McGall et al predictably results in a device usable for imaging of the DNA sensor

Regarding claims 12-13 and 17, the sensor of claim 11 is discussed above. As noted above apparatus claims cover what a device *is*, not what a device *does*. Therefore, the various uses recited in claims 12-13 and 17 (e.g., irradiating a phosphor [i.e., claim 12] or exciting a fluorescent substance [i.e., claims 13 and 17]) fail to define additional structural elements to the device of claim 11. Because the prior art teaches the structural elements of claim 11, claims 12 and 13-17 are also obvious over the prior art.

Response to Arguments

14. Applicant's arguments filed 30August 2007 (i.e., the "Remarks") have been fully considered but they are not persuasive for the reason(s) listed below.

A. Applicant states on page 29 of the Remarks that argues on polycrystalline silicon is a semiconductor, but that Hawkins et al does not disclose, teach, or suggest that polycrystalline silicon corresponds to an electrode, and is intended to be used as a semiconductor.

However, Hawkins et al explicitly teaches gate electrodes formed of polycrystalline silicon (column 10, lines 53-56).

B. Applicant further argues on page 29 of the Remarks that amorphous silicon cannot be used as an electrode.

However, this argument is confusing because the rejections do not rely on amorphous silicon as an electrode material; rather, as detailed above, a barrier layer of amorphous silicon is merely relied upon

as semiconductor layer (column 14, lines 15-31). Thus, Applicant's argument is moot because the teaching is not relied upon in the manner Applicant has suggested.

C. Applicant further argues on page 30 of the Remarks that the combination of Hollis et al with Hawkins et al would merely replace the gate electrode 220 of Hollis et al with the metals of Hawkins et al.

However, as detailed above, the modification of Hollis et al with the teachings of Hawkins et al is the modification of the single gate electrode CCD of Hollis et al to conform with the multiple gate electrode CCD of Hawkins et al, with the retention of the remaining structural features if immobilized DNA probes, light members, etc of Hollis et al as listed above. Thus, the modification is not just a replacement of a gate electrode of Hollis et al, but modification of the entire CCD of Hollis et al with the teachings of Hawkins et al.

D. Applicant's remaining arguments with respect to the previous rejections of the claims have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendments.

Conclusion

15. No claim is allowed.

16. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

17. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing

date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

18. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Robert T. Crow whose telephone number is (571) 272-1113. The examiner can normally be reached on Monday through Friday from 8:00 am to 4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ram Shukla can be reached on (571) 272-0735. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jehanne Sitton/
Primary Examiner
11/7/2007

Robert T. Crow
Examiner
Art Unit 1634